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ARTICLE

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Educational design research in collaboration with students: using digital tools to learn about reindeer herding within a vocational Sámi pedagogical context

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Abstract

This article aims to develop and update a reindeer herding study programme in a vocational school in Lapland, Finland in cooperation with the teachers and students. The possibilities for developing motivating learning environments are investigated in the context of reindeer herding, with the ultimate objective being to enhance student interest in their studies and working life through the use of digital technologies. Educational design research is optimal because it is founded upon the needs and challenges of education providers, and solutions can be developed through cyclical processes involving reindeer herding study programme students. Data were collected through focus group interviews. During the development process, particular attention was given to indigenous Sámi pedagogy to consider the students' sociocultural backgrounds and the ecocultural learning environment. The Triple E framework (Kolb, 2017) is applied to analyse the results in terms of how technology (a) motivates students to actively *engage* in learning, (b) *enhances* and builds upon their learning and (c) *extends* and bridges learning to students' everyday lives and working lives. Based on the results, we created a model of vocational Sámi pedagogy that highlights a working-life connection, sustainable ecocultural context, motivation and meaningful digital solutions.

Keywords: reindeer herding studies, educational design research, Sámi pedagogy, Triple E framework, model of vocational Sámi pedagogy, digital tools

Introduction

The current article is based on the results of a cooperative educational development project – *Arctic Pedagogy II, the Sámi Education Digital Network* – involving the University of Lapland and a Sámi vocational school. Arctic pedagogy has been developed to answer education demands faced with the barriers of long distances, changing ecocultural contexts and diversity. The project was conducted within a vocational education and training (VET) reindeer herding study programme *(Porotalouden osaamisala, poronhoitaja)*. VET provides students with the necessary qualifications and vocational knowledge to pursue their chosen occupation (Hiim, 2017). The study programme focused on in the current article provides students with basic vocational education on nature and the environment (180 ECTs) and the necessary qualifications to pursue a career as a reindeer herder. Reindeer herding classes at the studied Sámi vocational school take place in Toivoniemi, Kaamanen in the northern Inari municipality within Lapland, Finland.

Because of legislative reforms concerning vocational education, the Sámi vocational school expressed a need to develop and renew their reindeer herding study programme with digital technologies and to develop a learning culture. Hence, we set out to design vocational Sámi pedagogy that prepares students for contemporary working life and provides them with the appropriate technical knowledge. Digital material and resources provide a way to minimise challenges such as long distances between students' homes, their reindeer and school. However, a culturally relative approach is still required because of the students' cultural backgrounds and the geographical location (cf. Keskitalo, 2010; Linkola, 2014). There are different kinds of students participating from different backgrounds, levels of education and age groups. Both sexes take part in the school's VET. There are also many kinds of language backgrounds: Sámi as the mother tongue or Finnish. Students are normally either Sámi or Finns. According to Linkola (2014), who conducted research in a Sámi vocational school in Norway, for the diverse students to be able to emotionally connect to the group and school, organisers need to make visible these differences.

The current article addresses the challenges and experiences of students in the reindeer herding study programme in an effort to help the programme instruction be developed in the appropriate direction. An investigation of the current situation and the issues that need to be developed in the programme are presented. We chose to use the Triple E framework (Kolb, 2017) because it provides a sound basis for developing the study programme through reflection. We ask the following questions:

1. What kind of perspectives do the students have towards their studies?

2. How do students experience the use of digital technologies in their studies?

3. How can vocational Sámi pedagogy be implemented in the reindeer herding study programme in the context of digitalisation?

The current research pays particular attention to study design because the investigated study programme is based on learning through practical work and occasional on-campus learning. Students and teachers both need to know how to work in a situation in which digitalisation will remarkably

enhance learning (Atiku, 2018). Additionally, the students are studying in a field with changeable contexts, making learning challenging. In this respect, the current article narrates students' work and makes their experiences visible through a developed, research-based model.

Reindeer herding studies, Sámi education and digital technologies

The nature and environment reindeer herding study programme is described on the school's webpage[1] as physically demanding and involving challenging Arctic conditions; the programme is directed towards students who grew up in a reindeer herding environment and are interested in multidisciplinary outdoor work. Thus, collaboration with other reindeer herders in the students' home district is a natural part of the programme and profession. The reindeer herding programme involves various kinds of practical fieldwork and exercises to develop the required skills and key competencies. Students are provided information about nature, tools, materials, legislation, licensing, financing and compensation schemes, as well as Sámi language and mathematics lessons. Classes take place in nature, at the workplace and at school in Toivoniemi buildings and the surroundings. The facilities, 30 km outside Inari village and where the main building is located, have all the equipment and surrounding nature needed for reindeer herding vocational studies. Additionally, students practice in their own reindeer herding districts or somewhere else in case a student's family does not own reindeer. Teaching and workplace learning are organised to allow students to participate in seasonal reindeer herding tasks during each academic year; these tasks teach the students to be determined and systematic in their work, providing students with mastery over the reindeer husbandry cycle, as well as basic skills in related industries, such as fishing, hunting and forestry. Once finished with their studies, students can continue their family's reindeer herding business or become an independent entrepreneur.

Sámi education in Finland, Sweden, Norway and Russia is connected to multiple complex sociocultural and educational factors. Historically, it has been influenced by the church's goal of 'civilising' the area (from about 1600–1950) and by nationalistic ideologies (from the mid-1800s until the end of the 1970s; Keskitalo, Lehtola, and Paksuniemi, 2014). For example, in Russia, education in the Sámi language was forbidden from 1941 until 1980, and during the 1940s, 18 Sámi teachers were exiled to Siberia (Kotljarchuk, 2019). Norway implemented a Norwegianisation policy regarding the Sámi and Kven people with the aim of banning their languages and cultural identities. In Sweden, a policy of segregation was implemented, causing nomad Sámis to study at hut schools, while other children studied at communal schools. In Finland, the goal was assimilation, and Finnishness and Finnish language education were emphasised. No attention was paid to minorities or their issues (Kortekangas *et al*., 2019.) Historically, the Sámi have lived through a wide area of Scandinavia and the Russian Peninsula. Nowadays, the core areas in which Sámi live are the municipalities of Utsjoki, Sodankylä, Enontekiö and Inari in Finland, as described in the Act on the Sámi Parliament[2]. Historical, societal and linguistic factors, as well as increasing globalisation and digitalisation, have led to challenges related to the education of this population. The Sámi vocational school in Inari is a natural continuum to make and

[1] https://www.studentum.fi/koulutukset/saamelaisalueen-koulutuskeskus/luonto-ja-ymparistoalan-perustutkinto-poronhoitaja-107765

[2] Act on the Sámi Parliament. https://www.finlex.fi/fi/laki/kaannokset/1995/en19950974.pdf

organise study programmes that empower local indigenous society in many ways (cf. Aikio-Puoskari, 2009). Improving indigenous people's digital education situation has multiple benefits. Many minority languages struggle with low resources. For example, through and with digital tools and learning materials, the situation of threatened indigenous languages can be improved (e.g., Keskitalo, Frangou, and Chohan, 2019).

Sámi education is an umbrella pedagogical (and practical, scientific and philosophical) framework that arose in the last 30 years. Sámi education is considered an indigenous educational science, meaning that it specifically focuses on teaching indigenous knowledge, models, methods and content within formal or nonformal educational systems (Keskitalo, Määttä, and Uusiautti 2013; see also May and Aikman, 2003). Sámi education is based on traditional Sámi childrearing practices and philosophy and a multifaceted modern pedagogy that meets the educational demands of its learners (e.g., Balto, 1997, 2005, 2008). Nowadays, Sámi education is secured by national laws, including the Constitution of Finland, Early Childhood Education Act, Basic Education Act and the Act on General Upper Secondary Education and Vocational Education in Finland[3]. The Act of Vocational Education has specifically mentioned the Sámi language: education organisation's languages can be either Finnish, Swedish or Sámi (Laki ammatillisesta koulutuksesta 531/2017). Other acts, such as the Sámi Language Act, ensure the use and position of the Sámi language. In addition, international frameworks, such as the United Nations Declaration on the Rights of Indigenous Peoples, provide recommendations for indigenous education.[4] However, Sámi education still faces many challenges, including a lack of competent teachers and learning materials (Keskitalo *et al*., 2013; Rahko-Ravantti, 2016).

Students prepare for their vocational life in the Information and Communications Technology (ICT) era, while at the same time sustainable development should be achieved (Picatoste, Pérez-Ortiz, and Ruesga-Benito, 2018). Previous research has proved that introducing informal ICTs into formal education can be particularly beneficial and support learning not only in the use of those digital tools but also in the content (Chuang, 2017; Hsiao, Shu, and Huang, 2017; Milošević, Živković, Arsić, and Manasijević, 2015). ICT literacy – the ability to use digital tools to communicate, access, create and manage information – can provide a vehicle for the students to enhance their employability and fit labour market exigencies (ETS, 2002; Frangou, 2020; Picatoste *et al*., 2018), as well as improve their ability to function as active members of society (European Commission, 2008; Fraillon, Ainley, Schultz, Friedman, and Gebhardt, 2014). However, for one to develop ICT literacy, one needs to be motivated to use digital tools and consider them meaningful (Nauman and Sälter, 2017; Senkbeil, 2018; Zylka, Christoph, Kröhne, Hartig, and Goldhammer, 2015).

The European Centre for the Development of Vocational Training (CEDEFOP) assessed that 46% of enterprises in the EU consider job-specific technical and practical skills as the most important competencies in working life. Second was teamwork and social skills, which were prioritised by 41% of the enterprises (CEDEFOP, 2019). Hence, vocational education should be designed to provide student competencies for future careers. However, educational technologies have their limitations and

[3] Act on Vocational Education https://www.finlex.fi/fi/laki/ajantasa/2017/20170531
[4] http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/79095/UM_0516_YKn_julistus_Netti.pdf

challenges, even if they provide students with freedom of access and are cost-effective (Chang and Wang 2013). Instructional staff need to be constantly updated in their ICT skills and motivational techniques to improve the students' interest. Furthermore, the instructional staff need constantly updated tools and digital and nondigital teaching and learning materials to offer the best possible instruction (Shamim, Aktaruzzaman, and Clement, 2011). Technological innovation can radically change instruction, but foundational change is required for technological innovation to be utilised in a meaningful manner (Chang and Wang, 2013).

Triple E framework as a theoretical background

For the current study, we sought to find a theoretical framework that can function as a tool to reflect, investigate, analyse and explain vocational education instructional tool choices. Our theoretical framework is based on the Triple E framework (Kolb, 2017), which is applied to reflect on the results in terms of how technology (a) motivates students to actively *engage* in learning, (b) *enhances* and builds upon their learning and (c) *extends* learning to students' everyday and working lives. The objective of the framework is to guide education professionals to make meaningful instructional choices by reflecting on these three perspectives, hence evaluating how to select the proper digital tool for a specific learning goal. Furthermore, the Triple E framework (Kolb, 2017) seeks to motivate learning through justified and purposeful technological tools to provide better learning experiences and outcomes. The objectives of the Triple E framework fits the current study particularly well because the reindeer herding study programme involves a lot of practice outdoors in harsh weather conditions. In these circumstances, meaningful and well-thought-out choices of digital tools are particularly important and can lead to a positive impact on learning outcomes.

The Triple E framework has three different dimensions. First, engaged learning with and through digital technologies should motivate students to focus on the content of learning, not only the digital tool. Furthermore, it should promote active social learning and collaboration because dialogical collaborative knowledge construction deepens learning (Hirsh-Pasek *et al*., 2015, Ruhalahti, 2019). Second, the choice of digital tools for teaching and learning should be reflected on to determine whether their use enhances and builds upon learning or simply replaces an old method. In an optimal scenario, digital tools create opportunities for students to develop a multidimensional understanding of a topic (Hirsh-Pasek *et al*., 2015) and demonstrate their understanding in new, diverse ways. Third, educators should try to extend learning with and through digital technologies to the real world and the competencies that are needed there. In other words, applications taught in class should be used outside of class as well. Alternatively, they could serve as a bridge to reality or improve students' ability to use technology in their everyday lives, which has been proven to promote learning (Martín-Gutiérrez, Mora, Añorbe-Díaz, and González-Marrero, 2017).

For engaged learning, the aspect of motivation should be considered. In human behaviour, motivation acts as a driving force that guides, controls and gives dedication when achieving one's goals (Tohidi and Jabbari, 2012). Hence, motivation achieves change in performance and passes through challenges. Motivation is not tangible because motivation consists of 'private, unobservable

psychological, neural, and biological' factors (Reeves, 2012, pp. 151) but is defined as the inclination, energy, emotion and drive relevant to learning, working effectively and achieving results (Martin, Ginns, and Papworth, 2017). When it comes to students' benefits and needs, motivation can help them learn and do things in the most diverse ways. Motivation also guides students towards their desired goals, encouraging them to work with dedication (Tohidi and Jabbari, 2012). A student-centred learning environment enhances student motivation, giving learners the opportunity to work in challenging zones of engagement. Research has indicated the importance of considering motivational dimensions and self-regulated learning effects of learning activities and environments (McLoughlin and Luca, 2004). Furthermore, research has shown that learning motivation is increased by digital learning methods, leading to a significant positive influence on learning outcomes (Lin, Chen, and Liu, 2017).

One factor that can influence learning motivation and activity is the quality of teamwork and collaboration in the learning environment, which are important skills in working life (CEDEFOP, 2019). Introducing informal ICTs into formal education can provide support for communication over long distances, for joint projects and for problem solving between classmates and teachers, supporting learning not only in the use of those digital tools (Milošević *et al*., 2015). In reindeer herding practice and education, collaboration and teamwork are essential, however, training effective collaboration is rare in professional and graduate programmes (Cheruvelil *et al*., 2014). Without collaboration, it is difficult to communicate, give or receive feedback. Effective collaboration is a team effort that requires considering goals and processes, the ability to handle rudimentary changes among team members and trust (Benda *et al*., 2002; Cheruvelil *et al*., 2014; Eigenbrode *et al*., 2007).

Methods

In the current study, the educational design research (EDR) approach was selected as the optimal methodology because it is based on the actual needs and challenges of education (McKenney and Reeves, 2012, 2018), and in this case, the needs of Sámi vocational school to develop the reindeer herding study programme with digital technologies. The EDR framework draws from design-based research (DBR) while targeting specifically educational settings (Barab and Squire, 2004; Design-Based Research Collective, 2003). The EDR framework seeks to develop and refine solutions for real-world school challenges (McKenney and Reeves, 2012, 2018; Reeves, Herrington, and Oliver, 2005). Through the iterative phases of design research, an understanding of the challenges in the educational environment can be established by exploring and analysing the situation. After this, a solution can be designed and tested in an actual setting and then evaluated and reflected upon (McKenney and Reeves, 2012, 2018) in a cyclical process involving the students in question (in this case, reindeer herding students). The current article reports on the first phase of an EDR process that involved mapping and analysing the situation and challenges in the reindeer herding study programme.

Data were collected through focus group interviews with reindeer herding students (N = 15). The reindeer herding students came from different kinds of reindeer herding backgrounds or districts in the

Lapland province or parts of the Northern Ostrobothnia and Kainuu provinces.[5] Most students lived in the Sámi homeland. All of the interviewees were from reindeer herding backgrounds, aged 16 or older and studying for a vocational qualification.

In the three focus group interviews, students discussed their experiences in the study programme, which allowed them to learn both on campus through contact teaching and in a real workplace through practical work.

Focus group interviews

A focus group is a group discussion intended to gather information of the views of the participants. Focus group interviews are conducted in an open and judgement-free environment in which participants are encouraged to share their views. Group interviews aim to obtain specific responses to structured questions, while focus group interviews are less structured and allow for more spontaneity in discussions and interactions (Gray, 2014; Krueger and Casey, 2000). Researchers must be ready to handle any issues that arise during a focus group interview, and thus, it is best to involve an experienced moderator. Open questions need to be prepared although the researchers or moderators should be open to adding more questions based on the situation and where the discussion goes.

When conducting the focus group interview, we first considered the sample. Importantly, focus group interviews can be conducted in any setting and can focus on any issue as long as the sample size is sufficient and all the stakeholders are represented. In addition, researchers can ask more questions, clarify points and record gestures. If used in an early phase of the research, focus group interviews can help researchers understand unclear or unknown issues, explore hypotheses, identify issues and develop a clear research path. The reactions, feelings and experiences of the participants can be explored more easily compared with using other forms of research, such as observations, interviews or surveys. Furthermore, focus group interviews are beneficial for the participants; listening to the other participants may reveal that they share similar experiences, and together, the participants can build upon each other's ideas and experiences (Gray, 2014).

Focus group interviews have a few limitations. One obvious limitation is that the researcher has very limited control over the results and outcomes; because focus group interviews lead participants to talk about their experiences and reactions to the questions, it is difficult to control the discussion. In addition, researchers cannot force anyone to participate more when a few participants dominate the discussion. Furthermore, a usual interview should take a set amount of time, but time management can be tricky. If stopped in the middle, a discussion can lead to no conclusions. Also, it is difficult to bring a group together for a number of reasons, including participants' travel plans or work schedules and time constraints. Finally, there are limitations when the analysis starts; because a focus group is a discussion and experience, it is very challenging to interpret, and a researcher or moderator might give verbal suggestions or say something that influences the course of a conversation (Gray, 2014).

[5] See details about the area and exceptions at the following link: https://www.finlex.fi/fi/laki/ajantasa/1990/19900848

Ethical considerations

According to Porsanger (2004), indigenous peoples' interests, knowledge and experiences must be at the centre of research methodologies and construction of knowledge. We were motivated by our cooperative task in collaboration with the vocational school in developing Sámi education. At the same time, we were challenged by the complex task of combining and balancing research paradigms and ethics (see Smith, 1999), which caused challenges and questions. Therefore, when conducting the EDR process, we applied indigenous research methods and ethics to a Sámi education research framework.

Indigenous research methodologies rely on the transformative paradigm of research and the historical and cultural traditions of third-world and indigenous peoples (Chilisa, 2011). We anonymised the data because the interviewed youth are minors and indigenous people (Linkola and Keskitalo 2016). We did not pressure the youth to participate in the interviews, and they were informed of the aims and objectives beforehand. The research group was composed of members from different backgrounds, which helped ensure that the investigation was reliable and took multiple perspectives into consideration. Ethical guidelines were followed according to the Finnish Advisory Board on Research Integrity (2012) as well as according to the guidelines of research ethics of indigenous and Sámi research (cf. Stordahl, Tørres, Møllersen, and Eira-Åhren, 2015). The researchers were aware of the need to conduct research sensitively and respect the youth and institution's personnel's ideas and wishes. The interview became a place to share ideas and develop needs.

The first author is Sámi herself, thus having a strong connection to the study. Her particular strength as a researcher of the indigenous Sámi people and part of the indigenous Sámi community is her knowledge of the Sámi language and culture. The second author is nonindigenous Finnish, and the third author is of Pakistani origin living in Finland but share the interests of the first author in developing pedagogies for multicultural educational environments. Furthermore, the indigenous background of the first author and the nonindigenous backgrounds of the second and third authors facilitated the discussions in multicultural groups because the students could feel that their multicultural backgrounds were represented by the researchers.

Analysis

The three student focus group interviews lasted approximately one hour each. The practical and open questions were the base of the focus group interviews. The data were qualitative in nature and analysed using a content analysis method (Creswell, 2009). After listening to the audio data, a set of codes and analytical categories were defined (Hsieh and Shannon, 2005; McQueen, McLellan, Key, and Milstein, 2009) that represent the research questions of the current study. In the transcribed data, we then focused and grouped the data into two main categories, with each one representing a connection to the students' perspectives and their study experiences and motivation in conjunction with digital technologies. In the latter category, the supportive and hindering aspects were looked into to reflect on the Triple E framework of 'engage, enhance and extend'. Through an analysis of the data, we found patterns and identified different student perspectives and motivations. Students perspectives on their studies and their experiences of studies and digital education were the key issues.

The analysis was conducted by reflecting on the components of the Triple E framework (Kolb, 2017) to determine whether technology extends and bridges learning to students' future working lives, enhances and builds upon learning and motivates the students to actively engage in learning. Our objective was to understand students' perspectives of their studies, their experiences of the use of digital technologies in their studies, and see how vocational Sámi pedagogy can be implemented in the reindeer herding study programme in the context of digitalisation. Furthermore, because the current study is conducted in an indigenous context, the ecocultural aspect, meaning the reciprocity of ecology and culture, nature and human (Milstein *et al*. 2017), was considered particularly significant.

Results

Students' perspectives

To discover how studies can engage, enhance and extend learning as per Triple E framework, the students' own perspectives were important. Through an analysis of the data, we found that students had various objectives and attitudes. The interviews revealed four kinds of perspectives students had towards their studies: career choice; home background; entrepreneurship; and gender.

First, some students were very clear about their career choice because they came from a reindeer herding background. For them, getting an official vocational qualification was important because study points are required to obtain economic support (Ely-keskus).[6] According to the Government Decree on Animal Aid, reindeer herders receive 28,50 euros per reindeer. To qualify for this aid, the herder must own at least 80 reindeers at the end of the reindeer herding year.[7] Most students in this category aimed to be fully supported professional reindeer herders. They often were working full time with their own herds at home, so they had certain expectations about the content and organisation of their studies because they have limited available time.

Second, some students were determined to continue their family's tradition of reindeer herding and did not consider any other professions. However, some of these students' families did not encourage them in enrolling in vocational education and told them that they could learn everything they needed to in practice. However, these students still opted to enrol in the programme because to get financial support, one must have passed education to be a reindeer herder profession. One reason behind this lack of family support is also that a reindeer herder's profession is not seen as profitable. Another reason is that going away for studies means one person less working at home. The work pressures consist of demanding conditions, climate change, beasts, economic pressure and working in situations where land use can cause controversy. Parental fear may be appropriate because according to previous studies, reindeer herders face challenges related to changes in their societies, including changes in traditional land use, for example, the loss of grazing land and climate change (cf. Eira *et al*., 2008). Former studies of young reindeer herders have pointed out psychological load of anxiety and depression (Kaiser, 2011). However, a lack of home support was not faced by all students. In addition,

[6] The Centre for Economic Development, Transport and the Environment https://www.ely-keskus.fi/en/web/ely-en/
[7] https://valtioneuvosto.fi/paatokset/paatos?decisionId=0900908f8063c46d

several students seemed very motivated to consider the possibility of becoming an entrepreneur and developing and extending reindeer herding to include, for example, nature travel and tourism. They were also supported by their families.

Finally, we observed some differences in the perspectives from the different genders. In general, the interviewed male students seemed more committed to their career plans or had not considered any other options, while female students seemed to have weighed several possible options.

Students' perceptions of digital technology use in teaching and learning

The use of digital technologies is an integral part of vocational education and reindeer herding studies. Reindeer herders are entrepreneurs, so the competent use of office tools and knowledge of accounting, taxation and financial aid application is essential. Some educational programmes make use of students' mobile phones: WhatsApp is used for communication; academic achievements are marked in Wilma-solution; Moodle is used as a platform for teaching and learning materials; a species identification application is used to identify birds and plants; Google Drive is used to share class timetables and some assignments; and Adobe Connect is used for distance learning.

Students are expected to be able to competently use digital technologies and to have a computer to conduct their studies and function as entrepreneurs. This corroborates particularly with the third dimension of the Triple E framework, in which digital technologies' meaningfulness is based on their connection and extension of the studies to the students' everyday and working lives.

The data show that the students' experience with digital technologies varied. Some had limited knowledge and former education in these technologies, while others had more know-how and experience. Most students did not receive any particular training on digital technologies during basic education because these courses were optional:

> Author 1: "Did you have any ICT courses at school in basic education?"
>
> Student 1: "No."
>
> Student 2: "We had the option but did not want to take it as there were so many other options."

Students who had chosen to take these optional courses felt more competent with ICT, and this seemed to influence their view of digital technologies. The less digitally competent students perceived the use of digital technologies as rather strenuous, whereas the more competent students saw them as a normal part of life.

WhatsApp was the main application used for communication between students, but only a few students had used or were willing to use the voice messaging functionality. Photographs of their working conditions were often posted to other students. All students agreed that cooperation and communication on instant messaging platforms was beneficial for the class atmosphere and teamwork, supporting the first dimension of engagement of the Triple E framework (Kolb, 2017).

The students could see that digital devices had great potential to motivate them and enhance their learning, such as through digital games related to their field. Also, they were imaginative in thinking about how digital technologies could be used to connect their studies to their working lives and to motivate other students. For example, several students expressed that using augmented reality to catalogue reindeer of different ages with different coats and ear markings could help identify not only the animal and its owner, but also whether the animal has any health issues. Such an application could be used to recognise reindeer killed by predators, determine who needs to be contacted to retrieve the deceased animal and to whom to report the coordinates of the incident and send a picture. In addition, augmented and virtual reality could enhance students' learning about reindeer anatomy, which is important for slaughtering:

> Student 3: "Particularly in biology technology [this] could help because it is really hard to recognise or name intestines from an old drawing."
>
> Student 4: "That is the liver or the spleen."

These views have a direct connection to the Triple E framework's (Kolb, 2017) second dimension, in which a technological tool enhances learning. Furthermore, all students welcomed the idea of learning how to use drones to gather reindeers or see if predators are around. Hiring a pilot and a helicopter is very expensive, but drones are easy to use and more environmentally sustainable. The students suggested a virtual reality game in which they could practice using drones in unsuitable weather conditions before taking control of an actual drone. The career mindedness that was discovered in responses to research question one was obvious from these responses. The students' suggestions were directly connected to their future working lives, which seemed to be particularly motivating for the students, hence also providing the needed engagement in learning, as per the Triple E framework's (Kolb, 2017) first dimension.

How can vocational Sámi pedagogy be implemented in the reindeer herding study programme in the context of digitalisation?

Because one objective of the current research was to think about the role of Sámi education in the reindeer herding study programme in the context of digitalisation and study organisation, a sustainable ecocultural context needed to be considered. We aimed to apply Triple E framework (Kolb, 2017) to put into practice the ideas of Sámi pedagogy (Balto, 1997). Balto (2005) stated that the use of Sámi pedagogy in modern life can encourage and strengthen learners' identity and cultural values, and the model of learning can be recognised as part of our Sámi epistemology and cosmology for life. The main goal is to be preparing for life, which means to develop independent individuals who can survive in a given environment and to give the learners self-esteem and a zest for life and joy. The Sámi pedagogy strategies are often indirect, avoiding confrontations between any two parties involved. The tight link between nature and people is obvious in Sámi thinking. According to Balto, humans can only be successful in making their living if they cooperate with natural forces (2005). These philosophical ideas need to be applied in modern education contexts in Sámi education conditions. However, at the same

time, there are many kinds of students involved, all of whom can still benefit from the holistic ideas of the Sámi pedagogy.

According to the student interviews, flexible, integrative and cooperative working methods should be used to make learning achievable for the students and their role as active participants in their studies. Through reflection on the research process, the Triple E framework (Kolb, 2017) and results, as encouraged in the educational design research process (McKenney and Reeves, 2012, 2018), we defined some areas in which learning could be enhanced and features that are particularly important in culturally sensitive vocational Sámi pedagogy. These features include digitally enhanced learning, motivation to learn, connection between working life and school and learning in a sustainable ecocultural context. We developed a model of vocational Sámi pedagogy in which these features are intertwined (Figure 1).

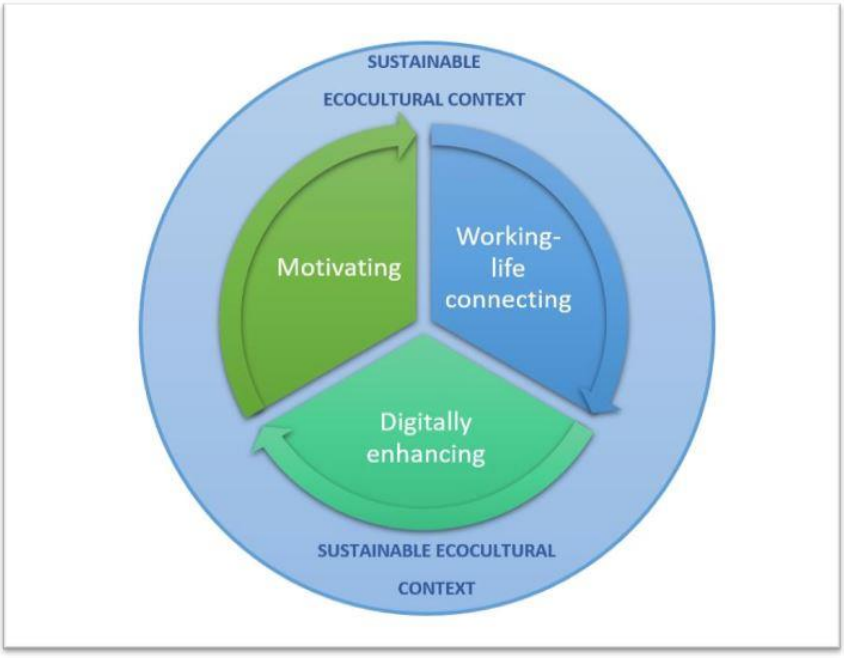

Figure 1. Model of vocational Sámi pedagogy

The Sámi pedagogy emphasises the sustainable ecocultural context, multicultural background and cultural traditions of indigenous people (Keskitalo *et al*., 2013). The model of vocational Sámi pedagogy seeks to help students become motivated regarding their schoolwork and see the connection between their theoretical studies and practical work. Furthermore, in the present vocational education context, the results indicate that a working-life connection plays an important role because education needs to provide students with the tools necessary to operate in today's labour market. Furthermore, the responses of the students support that digital technologies can be used not only to engage and motivate students, enable distance learning, but also to enhance their collaboration, learning and provide them with the digital competencies needed to function as active members of modern society and continuously

develop in their professional careers. Making these factors visible is important because every kind of knowledge and support of a study path is important. In sum, the model interlaces motivating and digitally enhanced teaching and learning that is connected to working life in a sustainable ecocultural context. The role of the teacher is to plan and conduct the educational contents in a way that carry out the ideas outlined in Figure 1.

Discussion and conclusion

Vocational education offers knowledge and learning environments that are clearly connected to the labour market and students' future working lives (Rintala and Jokelainen, 2019). In today's competitive, increasingly globalised world, digital technologies have become an integral part of the working life of many professions, even traditional reindeer herding. The objective of the current study was to investigate how students experience vocational reindeer herding studies and their views of using digital technology for work and school. Based on the findings, we created a model of vocational Sámi pedagogy that can be used to support any ecoculturally challenged vocational study programme and to reflect on the meaningfulness of the digital tools used for instruction based on EDR (McKenney and Reeves, 2012, 2018).

Digital competencies are vital in today's world, and these skills need to be updated regularly after completing a vocational programme. Therefore, it is important to increase students' positive attitudes towards continuous updating of digital skills. For motivational purposes, we suggest using facilitative approaches that enhance the communication skills among the students and between the students and teachers through reflection and feedback. If students come to school only occasionally, then these occasions should be well planned and promote not only learning, but also a team atmosphere, which is directly connected to motivation.

There are some limitations that should be acknowledged. First, the Triple E framework of 'engage, enhance and extend' (Kolb, 2017) is a new way to think about K–12 education, and it has not yet been implemented in the context of K–16 or adult education. Second, few empirical studies have used this framework, especially in the context of reindeer herding students, and thus, there is little prior work with which to compare the current research. However, the Triple E framework can support meaningful instructional choices because it focuses on learning goals, not specifically technological tools. The framework was developed as a tool for teachers to critically reflect upon and develop their teaching activities. Its core objectives are to develop good, meaningful and justified instructional strategies that positively impact students' learning achievements and outcomes; it helps researchers evaluate the appropriateness of digital tools in the context of students' everyday lives and supports socially constructed knowledge and active hands-on learning (Brown, Collins, and Duguid, 1989). Furthermore, Wartella (2015) pointed out the importance of time on task and active engagement. To meaningfully integrate technology into the classroom, teachers must consider the affordances of the technology in relation to the pedagogical approach and the specific subject matter (Mishra and Koehler, 2006).

In conclusion, today's vocational education needs to consider the potential and opportunities offered through the integration of digital technologies into teaching and learning. Technological choices need

to be meaningful, promote students' motivation and have a connection to students' future working lives. Additionally, in the indigenous Sámi context, students' sociocultural backgrounds and ecocultural worldviews need to be considered. To remain motivated and positive towards their studies, the reindeer herding students need a well-planned digital learning platform, opportunities for distance learning and well-organised school days that promote teamwork, a positive learning environment and motivation.

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